



# Hotspot-assisted fire spread mapping and fuel consumption estimates



Natural Resources  
Canada

Ressources naturelles  
Canada



GOFC-GOLD Fire IT meeting,  
Canadian Space Agency,  
Montreal, Feb. 7-9, 2005

Canada



# Goal

Estimates of carbon emissions from forest fires  
based on spatially and temporally explicit data

Fuel consumption depends on burning conditions

- Vegetation (fuel)
- Weather

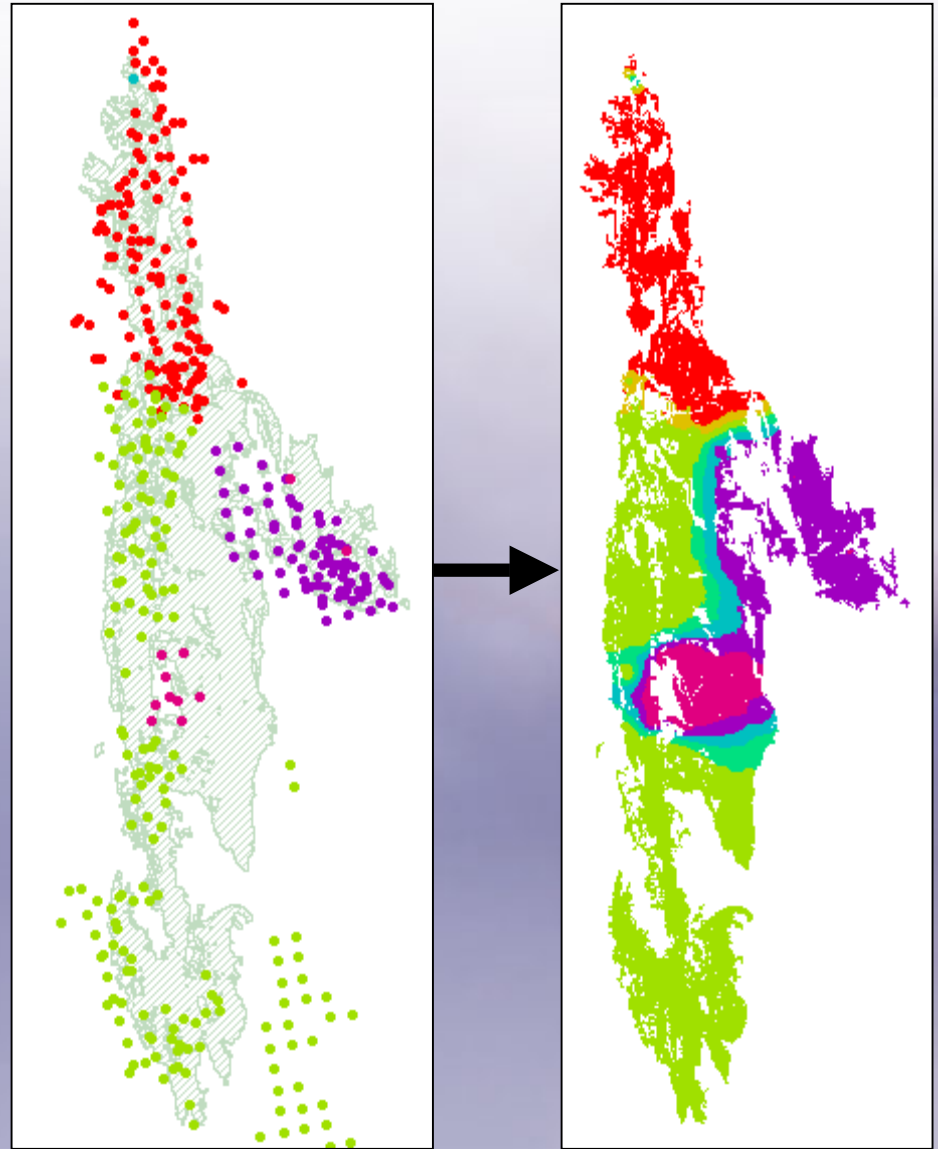




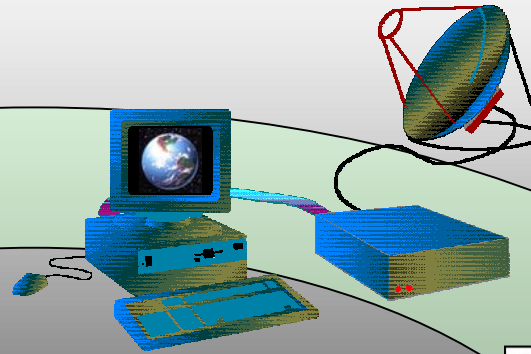
# Method

Interpolate hotspot  
dates to obtain  
burn progression  
map

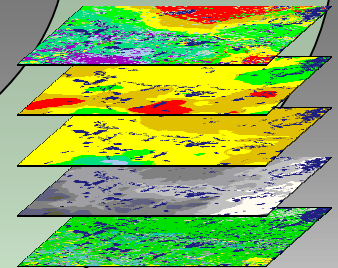
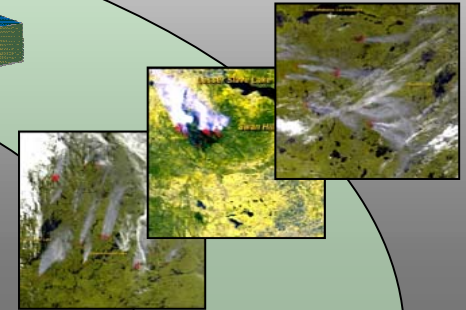
Fire perimeter map  
based on Landsat



# Hotspots



**Daily monitoring of actively burning wildfires using data from NOAA AVHRR and MODIS.**



**Canada**  
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**Canadian Wildland Fire Information System**  
Canadian Forest Service

The Canadian Wildland Fire Information System creates daily fire weather and fire behavior maps year-round and hot spot maps throughout the forest fire season, generally between May and September.

**Fire Weather**

**Fire**

**Regional Satellite**

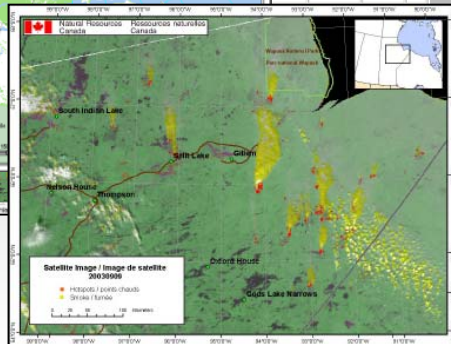
**Satellite Image / Image de satellite**  
2003/09/01

Hotspots / Points chauds  
Smoke / Fumée

View the most recent Hotspot Map  
View more Hotspot Maps

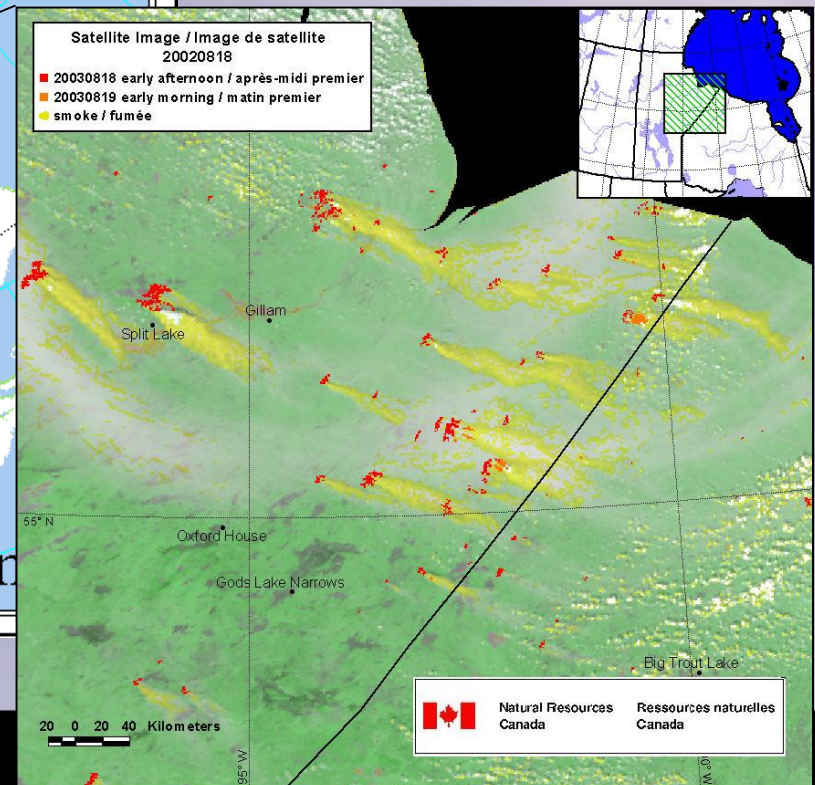
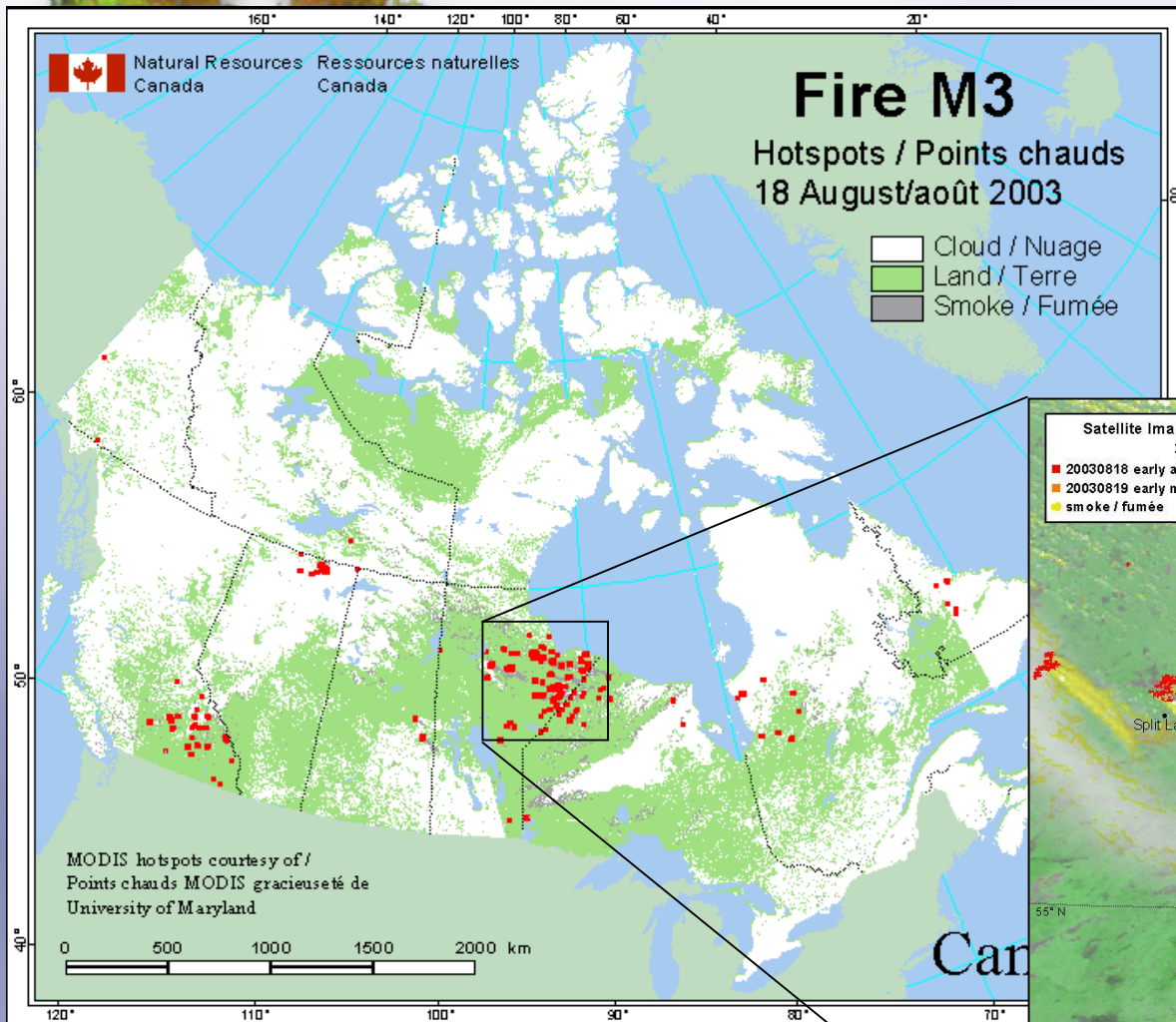
View the most recent Regional Satellite Image  
View more Regional Satellite Images

Ecrans	Hotspots / Points chauds		Smoke / Fumée		Cloud / Nuage
	Daily / quotidiens	Year-to-date / cumulés pour l'année	km²	km²	%
1	0	0	40	237303	96
2	0	12	351	1155720	77
3	0	60	71	538921	67
4	25	2691	2685	83567	14
5	0	3043	4539	348781	59
6	0	1312	11	686110	93
7	0	11951	19464	434082	54
8	0	1070	235	1027560	97
9	0	32	0	211639	100
10	0	10	24	112207	93
11	0	2502	13526	238342	33
12	0	258	1856	160431	35
13	0	144	1058	109138	43
14	0	527	381	406404	91



# Hotspots

Actively burning fires are identified and mapped using AVHRR and MODIS imagery.



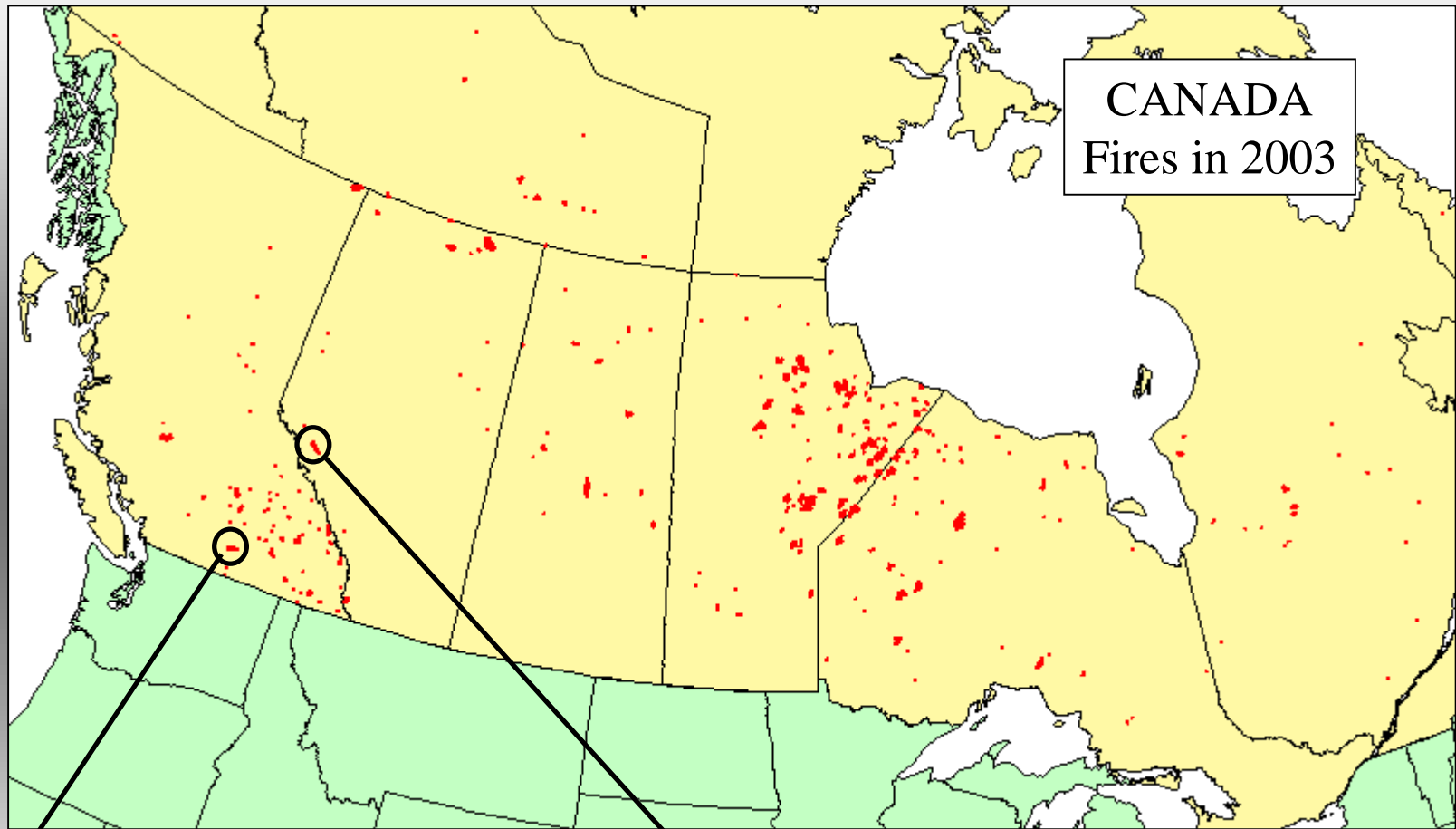
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Montreal, Feb. 7-9, 2005

# Interpolation methods comparison test fires



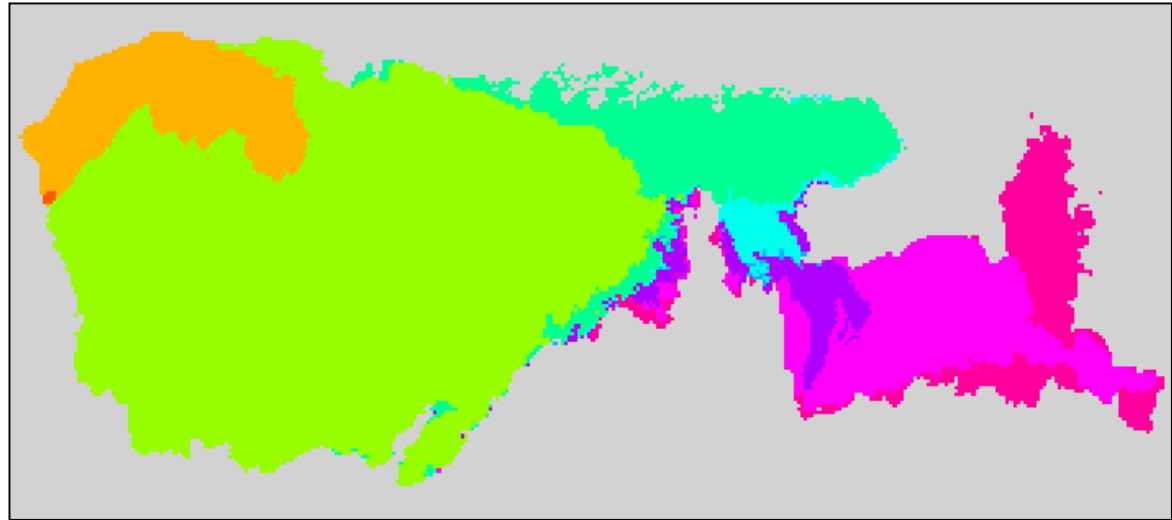
Okanagan Mountain Park  
August 16 - Sept. 8, 2003  
25,000 hectares

Syncline Ridge  
July 25 - August 9, 2003  
26,000 hectares

# Okanagan Mountain Park

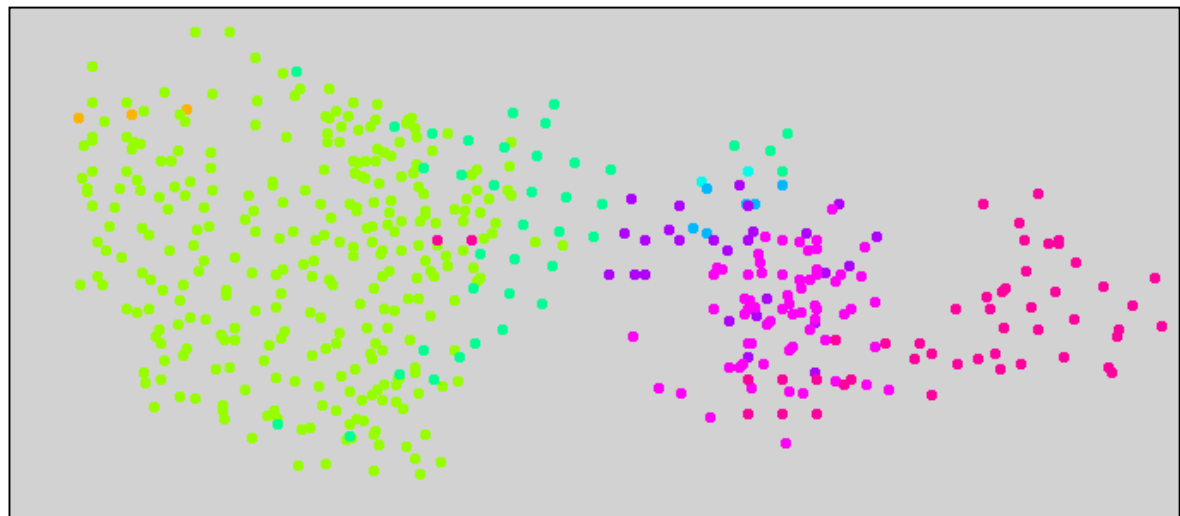
## Interpolating burn days

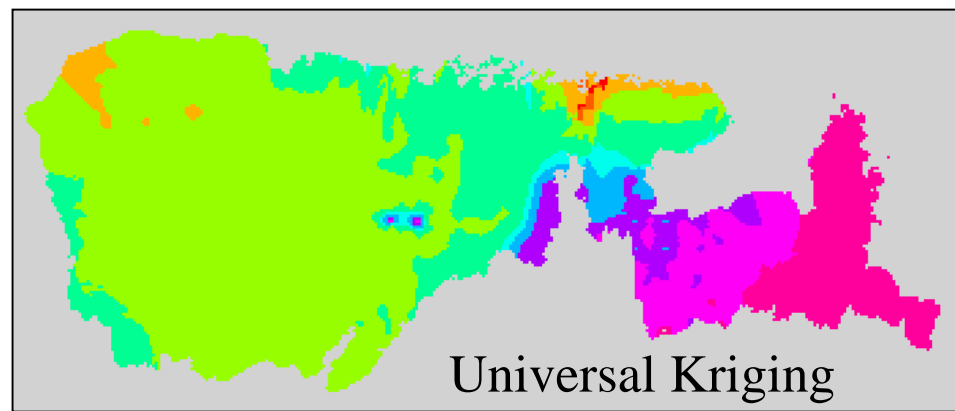
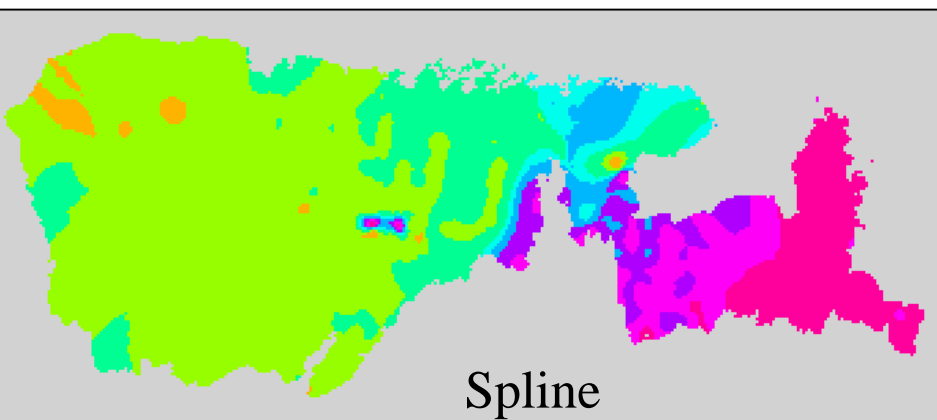
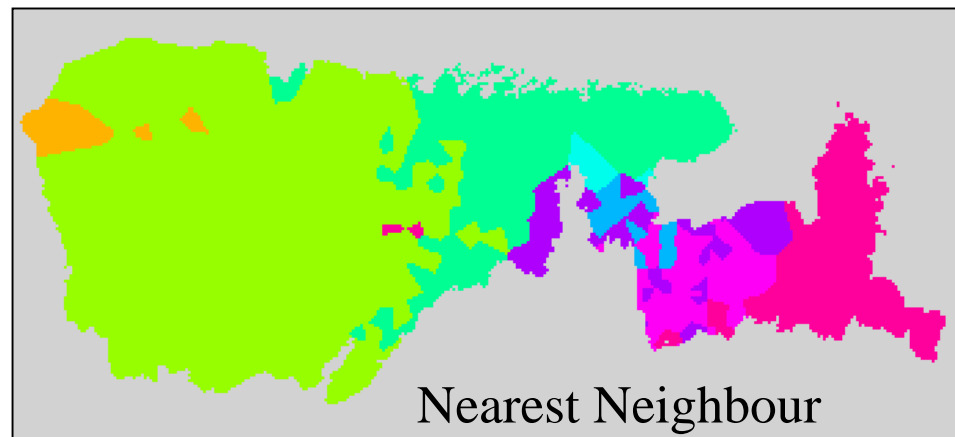
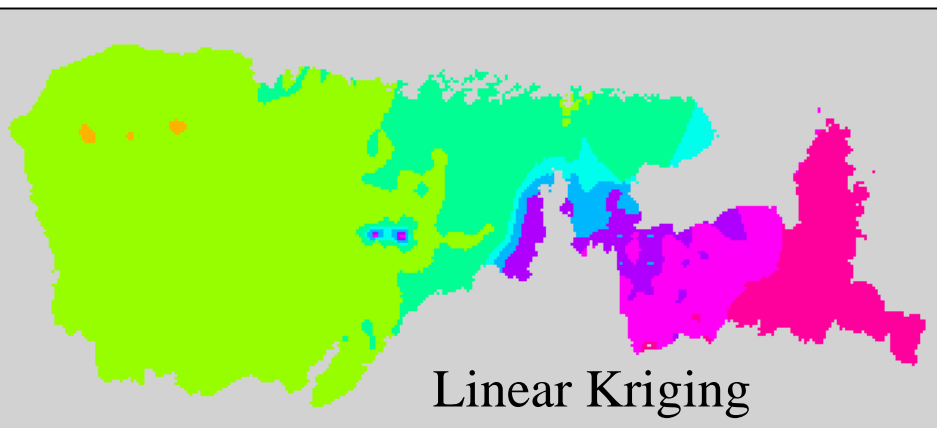
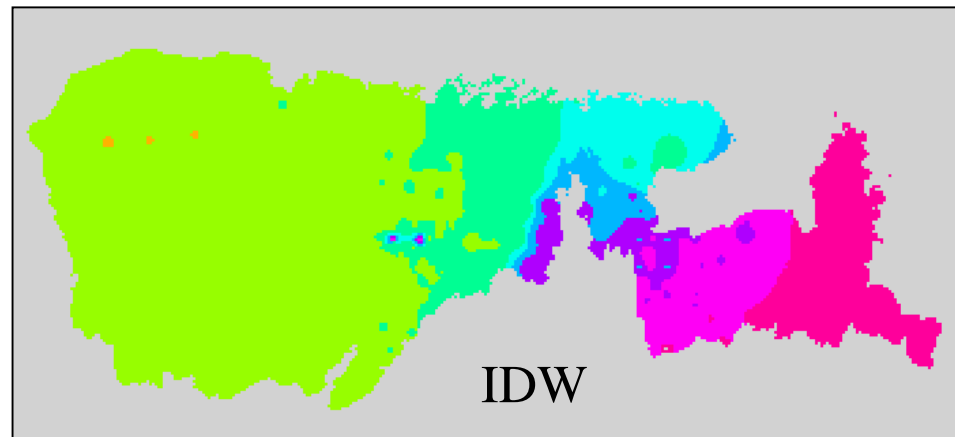
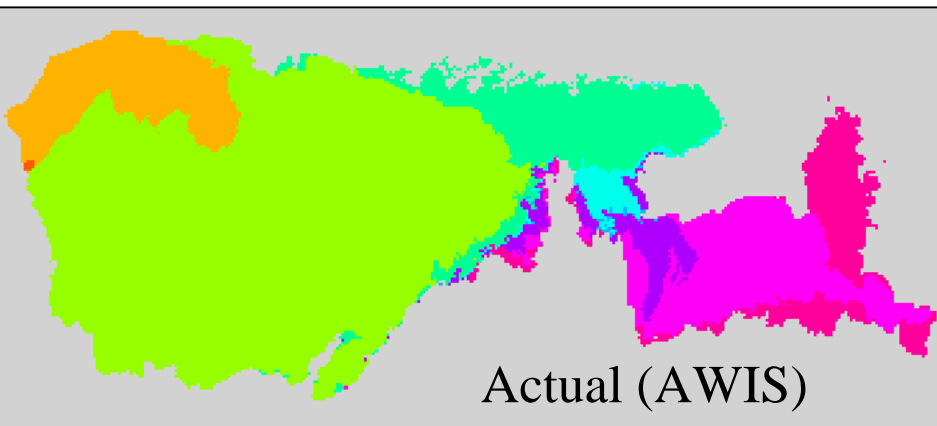
Julian date



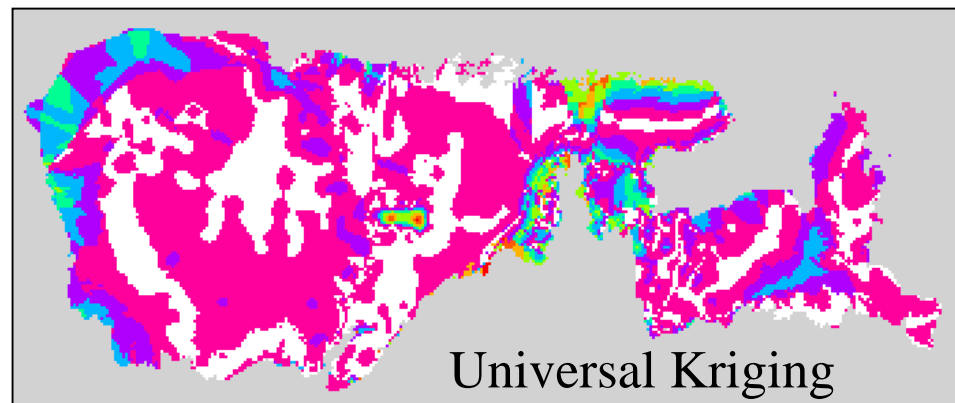
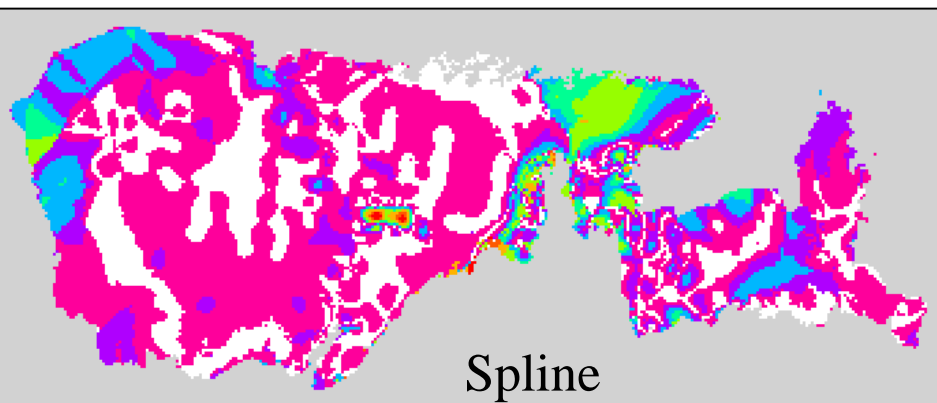
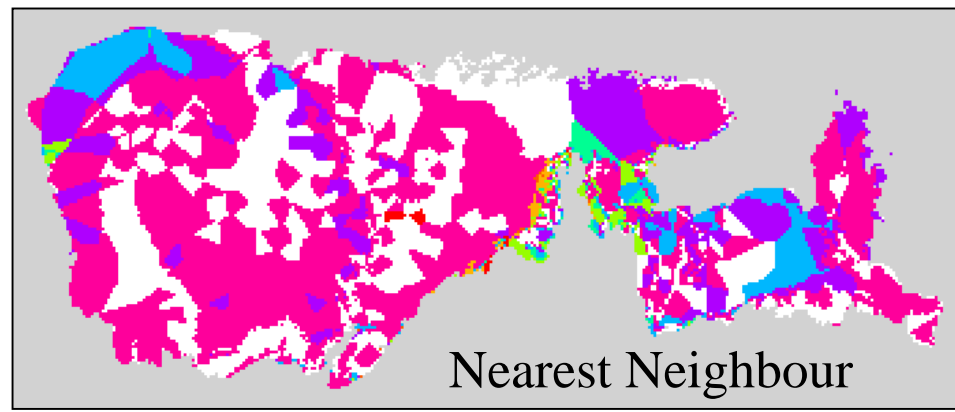
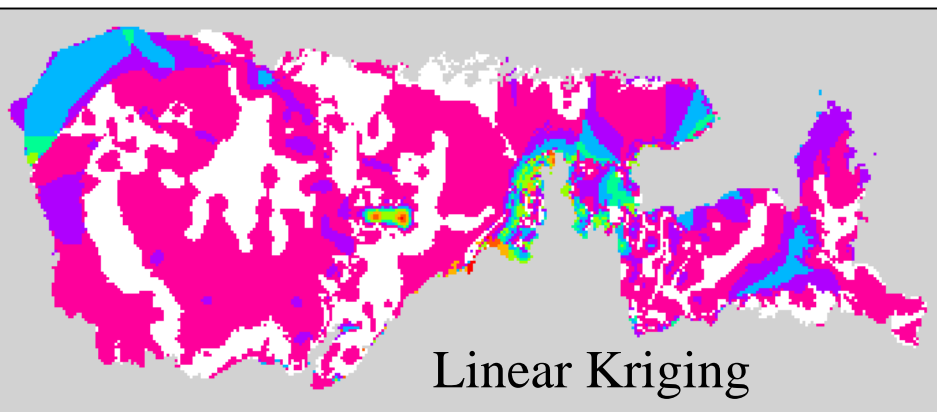
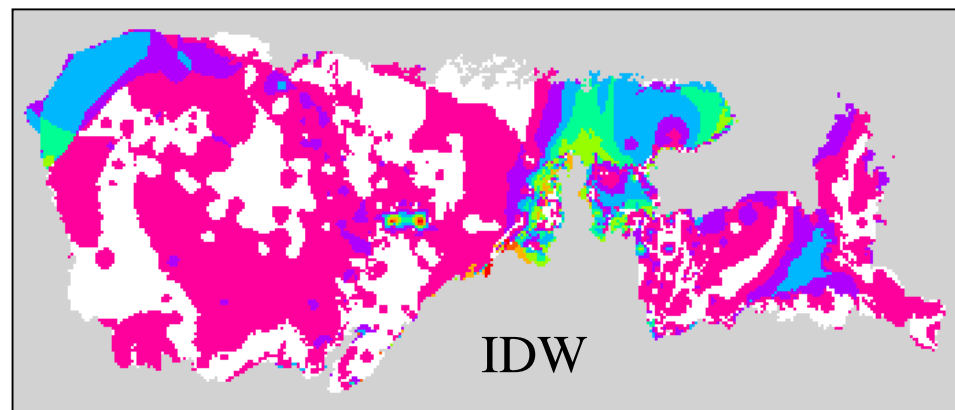
### 500 hotspots

- 66 AVHRR
- 434 MODIS

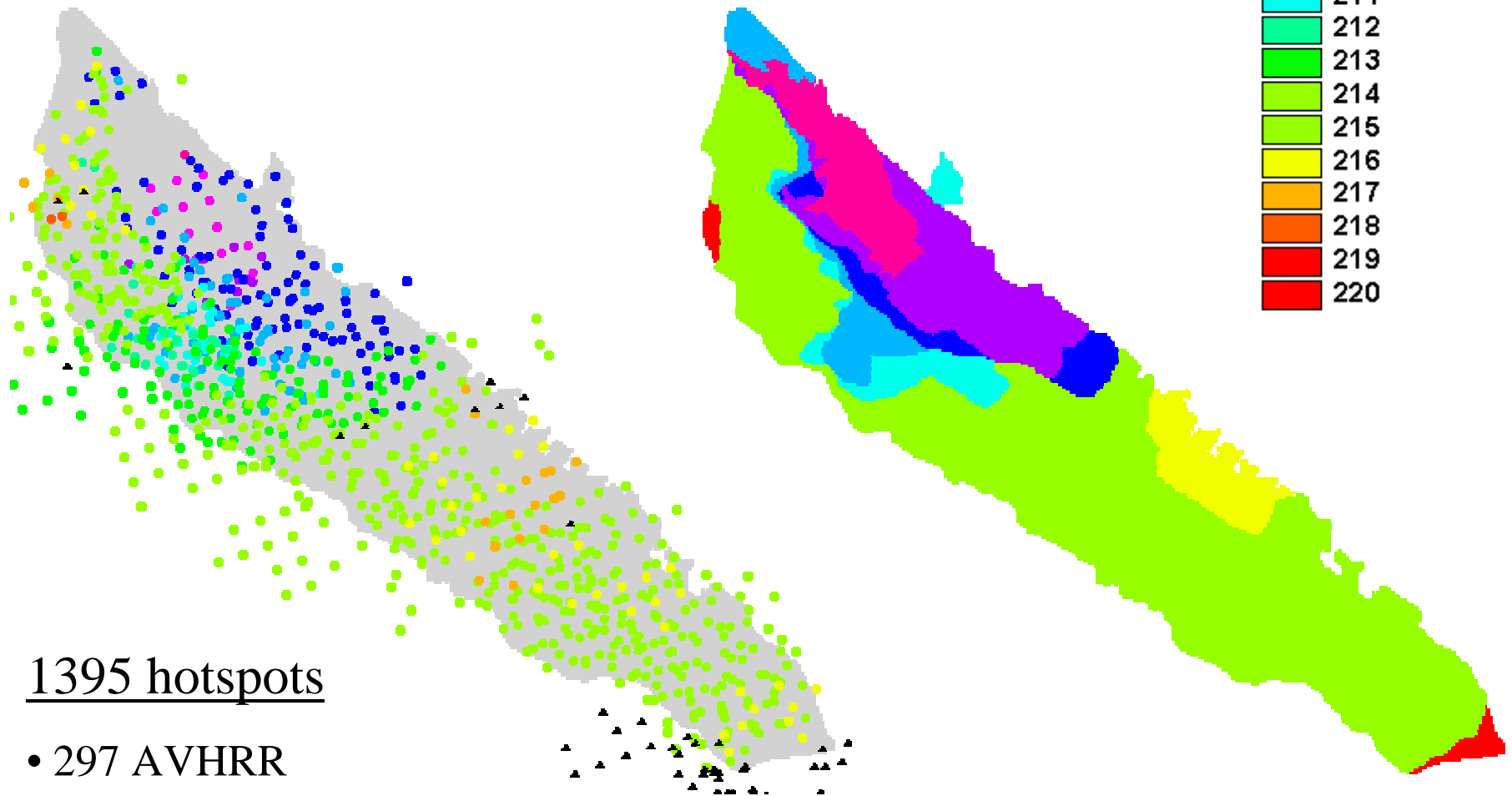




# Burn day anomalies



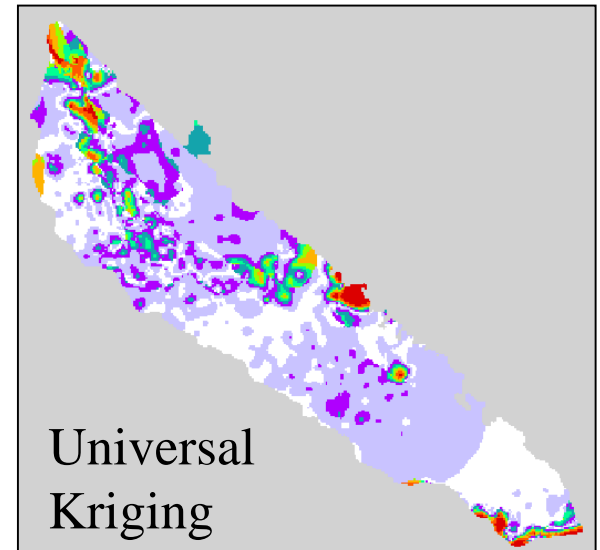
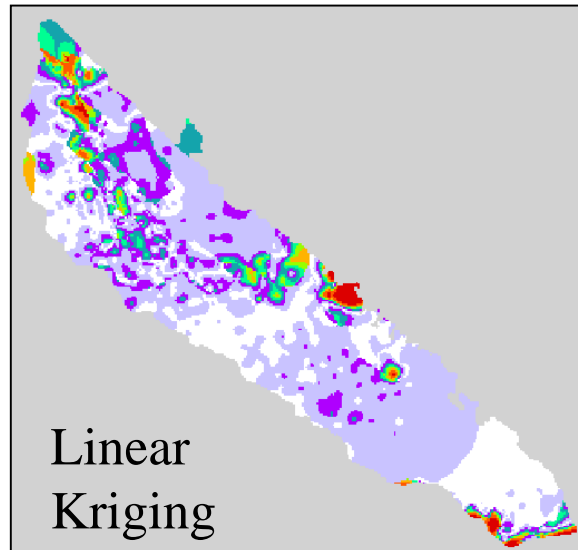
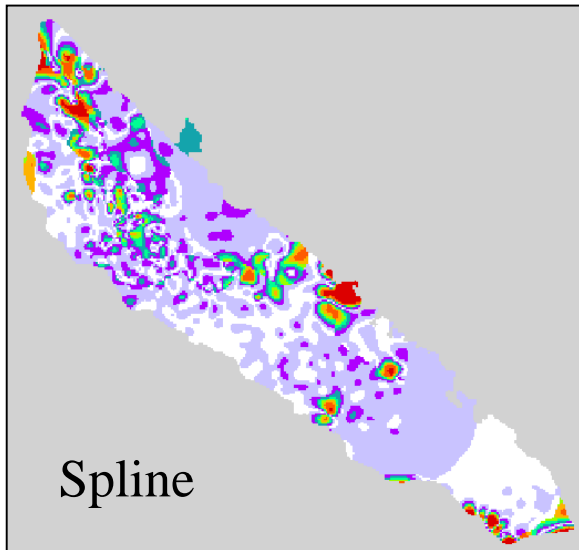
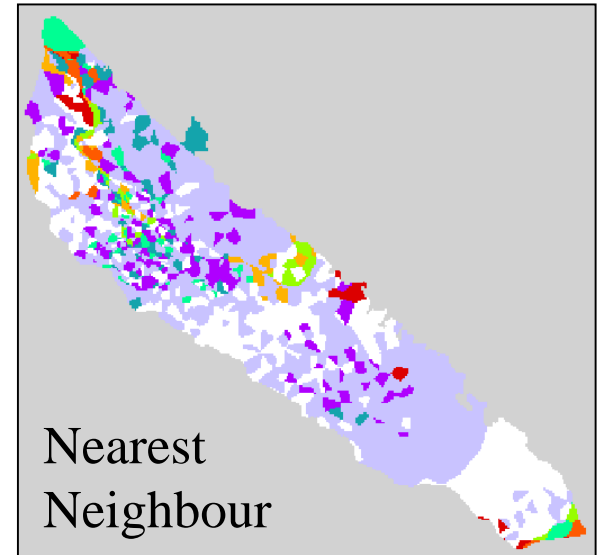
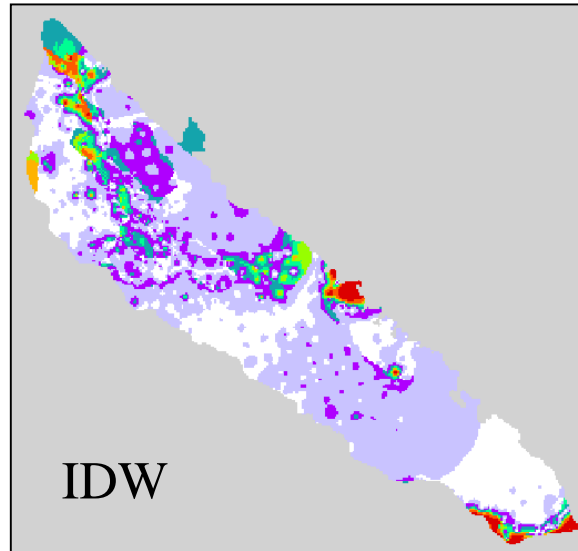
# Syncline Ridge



1395 hotspots

- 297 AVHRR
- 1098 MODIS

# Burn day anomalies





# Total Fuel Consumed

<i>Interpolation method</i>	<i>Okanagan Mountain</i>	<i>Syncline Ridge</i>
Actual	1195.2 kt	750.2 kt
Nearest neighbour	1196.4	759.5
IDW	1190.8	749.1
Spline	1195.0	745.3
Linear Kriging	1194.0	748.5
Universal Kriging	1195.7	748.3

